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FISH & RICHARDSON, PC
P.O. BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER	
BORSETTI, GREG	

ART UNIT	PAPER NUMBER
2626	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATDOCTC@fr.com

Office Action Summary	Application No.	Applicant(s)	
	10/568,564	MINDLIN ET AL.	
	Examiner	Art Unit	
	GREG A. BORSETTI	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 September 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/11/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-27 are pending.

2. Claim 27 has been added.

3. The objections to claims 24-26 having been improperly dependent on claim 22 has been withdrawn because they now correctly depend on claim 23.

4. The 35 USC 101 rejection of claim 22 is withdrawn.

5. Claims 11-18, and 19-21 are withdrawn from allowable subject matter and appropriate 35 USC 101 and 35 USC 112 rejections are supplied.

Response to Arguments

6. Applicant's arguments, filed 9/2/2008, with respect to the rejection(s) of claim(s) 1-3 under 102(b) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made with Uchiyama et al. (US Patent #5121428 hereinafter Uchiyama), and NPL document ("Topological analysis and synthesis of chaotic time series" hereinafter Mindlin).

Information Disclosure Statement

7. The Information Disclosure Statement (IDS) submitted on 9/11/2008 is in compliance with the provisions of 37 CFR 1.97.

8. Due to the submission of the IDS dated 9/11/2008, a reference has been cited

that teaches or fairly suggests all the claims that were previously considered to be allowable subject matter.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 19 and 22 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are:

a. As per claim 19, there is no recitation in the claim language as to how the database is provided, generated, and stored to ultimately compare the voiceprints for the purpose of speaker identification. Appropriate correction is required.

b. As per claim 22, also, there is no recitation in the claim language as to how the set of rational numbers characterizing topological features of spectral functions is processed and stored onto the storage medium. Appropriate correction is required.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

10. Claims 1, 12 and 19 are directed to a method which uses topological voiceprints

to determine speaker identity, and as claimed, is a manipulation of abstract ideas where the claims do not produce a useful, tangible, and concrete result. If the acts of a claimed process manipulate only numbers, abstract concepts or ideas, or signals representing any of the foregoing, the acts are not being applied to appropriate subject matter (Benson, 409 U.S. at 71-72, 175, USPQ at 676). Furthermore, claims define nonstatutory processes if they simply manipulate abstract ideas (Warmerdam, 33 F.3d at 1360,31 USPQ2d at 1759). As for guidance to areas of statutory subject matter, see 35 U.S.C. 101 Interim Guidelines (with emphasis of the Clarification of Interim Guidelines For Examination of Patent Applications for Subject Matter Eligibility); as an example, in Alappat, the claimed output smooth waveform (consisted of lighting pixels on an oscilloscope/display) is a useful, concrete, tangible, final result; in Arrhythmia, the claimed useful, concrete, tangible, final result represented the condition of a patient's heart; in State Street, the claimed useful, concrete, tangible, final result was data output that represented a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades. The biometric characterization of the speaker is used to verify the speaker from other speakers, but there is no output from the method claim linking the subject matter to a useful result.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 1-3, 11-22, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uchiyama et al. (US Patent #5121428 hereinafter Uchiyama) in view of NPL document ("Topological analysis and synthesis of chaotic time series" hereinafter Mindlin) with motivation from NPL Document ("Nonlinear aspects of analysis and synthesis of speech time series data" hereinafter Trevisan).

As per claim 1, Uchiyama teaches:

extracting spectral features from a speaker's voice (Uchiyama, column 1, lines 50-67 to column 2, lines 1-24, *...A feature extractor extracts features of an unknown for every segmented block by using the time-series acoustic parameters...*, and further, Uchiyama, column 5, lines 14-19, *...features are described by an arithmetical average of the time-series spectral data values over each of the blocks...)*

using a selection of the spectral features as a biometric characterization of the speaker to identify and verify the speaker from other speakers.

(Uchiyama teaches the use of a feature extractor which extracts spectral data values for speakers and compares it to registered users for the purposes of speaker identification, Uchiyama, column 1, lines 50-67 to column 2, lines 1-24.)

Uchiyama fails to teach, but Mindlin teaches:

the features being a set of topological indices from an embedding (Mindlin, Section 4, Embedding, furthermore Fig. 1 shows that the topological invariants are developed from the embedding.)

It would have been obvious to someone of ordinary skill in the art at the time of the invention to combine Mindlin with the Uchiyama device because all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention. NPL Document ("Nonlinear aspects of analysis and synthesis of speech time series data" hereinafter Trevisan) teaches that "Since realistic models of the folds can indeed present complex features at the level of the vocal fold oscillations, and even chaos [16, 6], it is important to know what to expect from the simplest models. Finally, we claim that a fitting procedure of physical parameters (of eventually richer models) can constitute an additional approach to the problem of speaker verification." Therefore, Trevisan teaches that it would have been obvious to model speaker verification using chaos theory and thus, the combination of Mindlin with Uchiyama would have been obvious to someone of ordinary skill in the art at the time of the invention.

It is noted for claims 1-3, the limitation of topological indices from an embedding of spectral functions as features is taught by Mindlin with the motivation above and will not be repeated below.

As per claim 2, claim 1 is incorporated and Uchiyama teaches:

analyzing a voice sample from a second speaker to extract a set of spectral features for the second speaker; (Uchiyama, column 1, lines 50-67 to column 2, lines 1-24, *...A feature extractor extracts features of an unknown for every segmented block by using the time-series acoustic parameters...*, and further, Uchiyama, column 5, lines 14-19, *...features are described by an arithmetical average of the time-series spectral data values over each of the blocks...)*

comparing the set of spectral features for the second speaker to the set of spectral features for the speaker; (Uchiyama, column 1, lines 50-67 to column 2, lines 1-24, *...A distance calculator for calculating a distance between the features of the unknown speaker extracted by the feature extractor and the reference features stored in the memory...*)

verifying the second speaker as the speaker when there is a match between the set spectral features for the second speaker to the set of topological indices for the speaker; and

identifying the second speaker as a person different from the speaker when there is not a match. (Uchiyama, column 5, lines 60-65, *...The decision making part 18 makes a decision of speaker verification by comparing the distance value calculated by the distance calculator 17 with a predetermined threshold value provided for each speaker. Then, the control object 2 is controlled by the discrimination result supplied from the decision making part 18...*, the speaker is verified as the second

speaker according to a match made by a threshold. If the match is below the threshold, the person is identified as an imposter, column 15, lines 24-27.)

As per claim 3, claim 1 is incorporated and Uchiyama teaches:

extracting sets of spectral features from voices of different known speakers; (Uchiyama, column 1, lines 50-67 to column 2, lines 1-24, ...*A feature extractor extracts features of an unknown for every segmented block by using the time-series acoustic parameters*..., this is stored for later comparison.)

analyzing a voice sample from an unknown speaker to extract a set of spectral features for the unknown speaker; (Uchiyama, column 1, lines 50-67 to column 2, lines 1-24, ...*A converter converts an input speech signal into an acoustic parameter for every frame at predetermined time intervals. A time-series of acoustic parameters forms a multi-dimensional feature vector*...)

comparing the set of spectral features for the unknown speaker to the sets of spectral features for the known speakers to determine whether there is a match; and (Uchiyama, column 1, lines 50-67 to column 2, lines 1-24, ...*A distance calculator for calculating a distance between the features of the unknown speaker extracted by the feature extractor and the reference features stored in the memory*...)

when there is a match, identifying the unknown speaker as a known speaker whose set of spectral features matches the set of spectral features for the unknown speaker.

(Uchiyama, column 1, lines 50-67 to column 2, lines 1-24, *...A decision part makes a decision as to whether or not the unknown speaker is a real speaker by comparing the calculated distance with a predetermined threshold value...*)

As per claim 11, claim 1 is incorporated and Uchiyama teaches:

processing the speech signal from the speaker to obtain spectral functions;

(Uchiyama, column 1, lines 50-67 to column 2, lines 1-24, *...A feature extractor extracts features of an unknown for every segmented block by using the time-series acoustic parameters...*, this is stored for later comparison.)

Uchiyama fails to teach, but Mindlin teaches:

constructing closed three-dimensional orbits from the functions;

(Mindlin, section 4, embedding.)

obtaining a set of topological indices from the orbit with respect to a reference;

and (Mindlin, section 6, Template identification, *...relative rotation rates...*)

selecting a subset of the topological indices as the biometrical signature for the speaker. ((Mindlin, section 6, Template identification, *...given a template, it is possible to compute tables of relative rotation rates and linking number for all (or any subset of) period orbits supported by that knot holder. Conversely, given a table of relative rotation rates or linking numbers, it is possible to use the subset of this table...*, it would have been obvious to someone of ordinary skill in the art at the time of the

invention to use subset of topological indices as a biometric signature because chaos theory as used in Mindlin can be used for speaker verification as shown below.)

It would have been obvious to someone of ordinary skill in the art at the time of the invention to combine Mindlin with the Uchiyama device because all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention. NPL Document ("Nonlinear aspects of analysis and synthesis of speech time series data" hereinafter Trevisan) teaches that "Since realistic models of the folds can indeed present complex features at the level of the vocal fold oscillations, and even chaos [16, 6], it is important to know what to expect from the simplest models. Finally, we claim that a fitting procedure of physical parameters (of eventually richer models) can constitute an additional approach to the problem of speaker verification." Therefore, Trevisan teaches that it would have been obvious to model speaker verification using chaos theory and thus, the combination of Mindlin with Uchiyama would have been obvious to someone of ordinary skill in the art at the time of the invention.

As per claim 12, Uchiyama teaches:

recording and processing a speech signal from a speaker;

(Uchiyama, column 1, lines 50-67 to column 2, lines 1-24, *...A feature extractor extracts features of an unknown for every segmented block by using the time-series*

acoustic parameters..., and further, Uchiyama, column 5, lines 14-19, ...*features are described by an arithmetical average of the time-series spectral data values over each of the blocks*...,the extraction is being performed on an input speech signal.*)*

computing linear prediction coefficients from the speech signal;

(Uchiyama suggests the use of linear prediction coefficients column 1, lines 14-21 as it is well known in the art.)

computing power spectrum from the linear prediction coefficients;

(Uchiyama suggests the use of a power spectrum for the voice energy column 1, lines 14-21 as it is well known in the art. It would have been obvious to someone of ordinary skill in the art at the time of the invention to compute the power spectrum from the LPC coefficients to speed up processing.)

Uchiyama fails to teach but Mindlin teaches:

constructing a three-dimensional periodic orbit; constructing a three-dimensional periodic orbit of a natural reference signal; (Mindlin, section 7, Template verification, a template is identified as well as a measured topological invariant alternative. Each of these templates is a three-dimensional periodic orbit as is shown in section 4, Embedding.)

obtaining topological information about the periodic orbits of the signal and the natural reference signal; and (Mindlin, section 6, Template identification, the templates are identified by the relative rotation rates and linking numbers of all pairs of periodic orbits.)

using a selective set of topological indices to distinguish a template which produces the signal from others who have different topological indices. (Mindlin, section 7, Template verification, a template is identified as well as a measured topological invariant alternative.)

It would have been obvious to someone of ordinary skill in the art at the time of the invention to combine Mindlin with the Uchiyama device because all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention. NPL Document ("Nonlinear aspects of analysis and synthesis of speech time series data" hereinafter Trevisan) teaches that "Since realistic models of the folds can indeed present complex features at the level of the vocal fold oscillations, and even chaos [16, 6], it is important to know what to expect from the simplest models. Finally, we claim that a fitting procedure of physical parameters (of eventually richer models) can constitute an additional approach to the problem of speaker verification." Therefore, Trevisan teaches that it would have been obvious to model speaker verification using chaos theory and thus, the combination of Mindlin with Uchiyama would have been obvious to someone of ordinary skill in the art at the time of the invention.

It is noted for claims 13-18, the limitation of topological indices from an embedding of spectral functions as features is taught by Mindlin with the motivation

above and will not be repeated below.

As per claim 13, claim 12 is incorporated and Uchiyama fails to teach, but Mindlin teaches:

the topological information is obtained from relative rotation rates between the periodic orbit of the speech signal and another reference orbit and/or rotation rates of the periodic orbit with itself. (Mindlin, Page 230, …*3. Relative rotation rates and linking numbers*…)

As per claim 14, claim 12 is incorporated and Uchiyama fails to teach, but Mindlin teaches:

the topological information is obtained from an orbit by computing linking properties and/or self linking properties. (Mindlin, Page 230, …*3. Relative rotation rates and linking numbers*…)

As per claim 15, claim 12 is incorporated and Uchiyama fails to teach, but Mindlin teaches:

the topological information is obtained from the orbit by computing a knot type in an embedding. (Mindlin, Page 238, …*periodic orbits supported by the knot-holder*…)

As per claim 16, claim 12 is incorporated and Uchiyama fails to teach, but Mindlin teaches:

each three-dimensional periodic orbit is constructed with respect to a Cartesian coordinate system with axes defined by the power spectrum with different phase delays. (Uchiyama teaches the power spectrum above in claim 12. Then, Mindlin, Section 4, Embedding, *...such self-intersections show that relative rotation rates and linking numbers are not invariant, but rather depend on the time delay...we call a differential phase space embedding...*, the phase delay defines the embedding. The equations (3 and 4) are with respect to x and y, common notations for Cartesian space. Also see Fig 5(a).)

As per claim 17, claim 12 is incorporated and Uchiyama fails to teach, but Mindlin teaches:

each three-dimensional periodic orbit is constructed with respect to a Cartesian coordinate system with axes defined by other integrodifferential embeddings. (Mindlin, Page 233, Mindlin teaches a Belousov-Zhabotinsky embedding which could also be used.)

As per claim 18, claim 12 is incorporated and Uchiyama teaches:

forming a database to include different selective sets of features for a plurality of known speakers; and (Uchiyama, column 1, lines 50-67 to column 2, lines 1-24, *...A distance calculator for calculating a distance between the features of the unknown*

speaker extracted by the feature extractor and the reference features stored in the memory..., the memory is a database of known speaker features.)

comparing a selective set of features of an unknown speaker to the database to determine if there is a match. (Uchiyama, column 1, lines 50-67 to column 2, lines 1-24, *...A distance calculator for calculating a distance between the features of the unknown speaker extracted by the feature extractor and the reference features stored in the memory...*, there is a comparison between features to determine if the speaker is stored in the reference memory.)

Uchiyama fails to teach, but Mindlin teaches:

the features being a set of topological indices from an embedding (Mindlin, Section 4, Embedding, furthermore Fig. 1 shows that the topological invariants are developed from the embedding.)

As per claim 19, Uchiyama teaches:

providing a database having voice prints of known speakers; and comparing a voice print of an unknown speaker to the database to determine if there is a match. (Uchiyama, column 1, lines 50-67 to column 2, lines 1-24, *...A distance calculator for calculating a distance between the features of the unknown speaker extracted by the feature extractor and the reference features stored in the memory...*, the memory is a database of known speaker features. There is a comparison between features to determine if the speaker is stored in the reference memory)

Uchiyama fails to fully teach, but Mindlin teaches:

wherein each voice print includes a set of topological numbers to distinguish a speaker from other speakers and is derived from a relation between a periodic orbit derived from a power spectrum of the speaker's voice and periodic orbit from a power spectrum of an audio reference in a three-dimensional space;

(Uchiyama teaches the use of a power spectrum for voice prints as in the rejection of claim 12. Mindlin teaches the use of deriving topological numbers from the relation between a periodic orbit and a reference periodic orbit in a three-dimensional space, Mindlin, section 6, Template identification and section 7, Template verification. The templates are identified through topological numbers (relative rotation rates and linking numbers) in section 6, and compared against each other (one template is known (measured) and one is hypothesized (tentatively identified)) in section 7 for verification.

It would have been obvious to someone of ordinary skill in the art at the time of the invention to combine Mindlin with the Uchiyama device because all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention. NPL Document ("Nonlinear aspects of analysis and synthesis of speech time series data" hereinafter Trevisan) teaches that "Since realistic models of the folds can indeed present complex features at the level of the vocal fold oscillations, and even chaos [16, 6], it is important to know what to expect from the

simplest models. Finally, we claim that a fitting procedure of physical parameters (of eventually richer models) can constitute an additional approach to the problem of speaker verification." Therefore, Trevisan teaches that it would have been obvious to model speaker verification using chaos theory and thus, the combination of Mindlin with Uchiyama would have been obvious to someone of ordinary skill in the art at the time of the invention.

It is noted for claims 20-21, the limitation of topological indices from an embedding of spectral functions as features is taught by Mindlin with the motivation above and will not be repeated.

As per claim 20, Uchiyama teaches:

power spectrum functions; (Uchiyama suggests the use of a power spectrum for the voice energy column 1, lines 14-21 as it is well known in the art)

Uchiyama fails to teach, but Mindlin teaches:

the three-dimensional space is defined by functions with different delay values; (Mindlin, Section 4, Embedding, ...*such self-intersections show that relative rotation rates and linking numbers are not invariant, but rather depend on the time delay...we call a differential phase space embedding*..., the phase delay defines the embedding. The equations (3 and 4) are with respect to x and y, common notations for Cartesian space. Also see Fig 5(a).)

As per claim 21, Uchiyama fails to teach, but Mindlin teaches:

the three-dimensional space is defined as a three-dimensional integrodifferential embedding. (Mindlin, Page 233, *...it is therefore necessary to construct a three-dimensional embedding of the strange...we employed an integral-differential filter...*,)

As per claim 22, Uchiyama teaches:

a storage medium that stores a set of numbers characterizing spectral functions to distinguish a speaker from other speakers. (Uchiyama, abstract, ... reference features stored in a memory..., the features are described in Uchiyama, column 5, lines 14-19, *...features are described by an arithmetical average of the time-series spectral data values over each of the blocks*...the abstract also describes the comparison between the input features and the reference features to distinguish a speaker from others.)

power spectrum functions; (Uchiyama suggests the use of a power spectrum for the voice energy column 1, lines 14-21 as it is well known in the art)

Uchiyama fails to teach, but Mindlin teaches:

wherein the topological parameters are derived from a relation between a periodic orbit from a function of the periodic orbit in a three-dimensional space. (Mindlin teaches the use of deriving topological numbers from the relation between a periodic orbit and a reference periodic orbit in a three-dimensional space, Mindlin,

section 6, Template identification and section 7, Template verification. The templates are identified through topological numbers (relative rotation rates and linking numbers) in section 6, and compared against each other (one template is known (measured) and one is hypothesized (tentatively identified)) in section 7 for verification.

It would have been obvious to someone of ordinary skill in the art at the time of the invention to combine Mindlin with the Uchiyama device because all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention. NPL Document ("Nonlinear aspects of analysis and synthesis of speech time series data" hereinafter Trevisan) teaches that "Since realistic models of the folds can indeed present complex features at the level of the vocal fold oscillations, and even chaos [16, 6], it is important to know what to expect from the simplest models. Finally, we claim that a fitting procedure of physical parameters (of eventually richer models) can constitute an additional approach to the problem of speaker verification." Therefore, Trevisan teaches that it would have been obvious to model speaker verification using chaos theory and thus, the combination of Mindlin with Uchiyama would have been obvious to someone of ordinary skill in the art at the time of the invention.

Claim 27 is rejected for the same reasons as claim 22 for having similar limitations.

12. Claims 4-7, 9-10, and 23-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uchiyama et al. (US Patent #5121428 hereinafter Uchiyama) in view of NPL document ("Topological analysis and synthesis of chaotic time series" hereinafter Mindlin) with motivation from NPL Document ("Nonlinear aspects of analysis and synthesis of speech time series data" hereinafter Trevisan) and further in view of Parra. (US Patent #5313556).

As per claim 4, claim 1 is incorporated and Uchiyama teaches:

storing the set of spectral spectral features for the speaker; (Uchiyama, column 1, lines 50-67 to column 2, lines 1-24, *...A feature extractor extracts features of an unknown for every segmented block by using the time-series acoustic parameters...*, this is stored for later comparison.)

analyzing the obtained voice sample form the user to extract a set of spectral features for the user; (Uchiyama, column 1, lines 50-67 to column 2, lines 1-24, *...A converter converts an input speech signal into an acoustic parameter for every frame at predetermined time intervals. A time-series of acoustic parameters forms a multi-dimensional feature vector...*)

comparing the set of spectral features for the speaker and the set of spectral features for the user to determine if there is a match, and (Uchiyama, column 1, lines 50-67 to column 2, lines 1-24, *...A distance calculator for calculating a distance*

between the features of the unknown speaker extracted by the feature extractor and the reference features stored in the memory...)

identifying the user as the speaker when there is a match.

(Uchiyama, column 1, lines 50-67 to column 2, lines 1-24, ...*A decision part makes a decision as to whether or not the unknown speaker is a real speaker by comparing the calculated distance with a predetermined threshold value*...)

Uchiyama fails to teach, but Mindlin teaches:

the features being a set of topological indices from an embedding

(Mindlin, Section 4, Embedding, furthermore Fig. 1 shows that the topological invariants are developed from the embedding.)

It would have been obvious to someone of ordinary skill in the art at the time of the invention to combine Mindlin with the Uchiyama device because all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention. NPL Document ("Nonlinear aspects of analysis and synthesis of speech time series data" hereinafter Trevisan) teaches that "Since realistic models of the folds can indeed present complex features at the level of the vocal fold oscillations, and even chaos [16, 6], it is important to know what to expect from the simplest models. Finally, we claim that a fitting procedure of physical parameters (of eventually richer models) can constitute an additional approach to the problem of

speaker verification." Therefore, Trevisan teaches that it would have been obvious to model speaker verification using chaos theory and thus, the combination of Mindlin with Uchiyama would have been obvious to someone of ordinary skill in the art at the time of the invention.

Uchiyama and Mindlin fail to teach, but Parra teaches:

the storage medium being a portable storage device. (Parra, column 2, lines 46-53, *...The digitized portions of the card owner's name (for example) voice samples, prepared as described herein, are recorded on the magnetic strip of a credit bank, or charge card. At the point of use, the card holder is requested to speak his or her name which is transduced to electrical signals, digitized and compared against a stored digital rendition using the principles of this invention...*, Parra stores the voiceprint of the speaker on a portable device.)

obtaining a voice sample from a user in possession of the portable device; (Parra, Column 2, lines 46-53, *...At the point of use, the card holder is requested to speak his or her name which is transduced to electrical signals, digitized and compared against a stored digital rendition using the principles of this invention...*)

providing a reader device to read the set of features for the speaker from the portable device; (Parra, column 2, lines 46-53, *...At the point of use, the card holder is requested to speak his or her name which is transduced to electrical signals, digitized and compared against a stored digital rendition using the principles of this invention...* The name is transduced to be compared to the digitized signal present on

the card (portable device), There would have been a reader device because the processing does not occur on the card (portable device).)

It would have been obvious to someone of ordinary skill in the art at the time of the invention to combine Parra with the Mindlin and Uchiyama device to have a portable verification system such that the user can swipe the card of Parra to compare their voice identification instead of verbally speaking every time identification is needed. Furthermore, this keeps the user's voiceprint uniform as the voice may change due to age or sickness and identification will be incorrect.

It is noted for claims 5-7, 9-10, the limitation of topological indices from an embedding of spectral functions as features is taught by Mindlin with the motivation above and will not be repeated below.

As per claim 5, claim 4 is incorporated and Uchiyama and Mindlin fail to teach, but Parra teaches:

a magnetic storage device as the portable device. (Parra, column 2, lines 46-53, ...*The digitized portions of the card owner's name (for example) voice samples, prepared as described herein, are recorded on the magnetic strip of a credit bank, or charge card. At the point of use, the card holder is requested to speak his or her name which is transduced to electrical signals, digitized and compared against a stored digital rendition using the principles of this invention*..., Parra stores the voiceprint of the speaker on a portable device.)

It would have been obvious to someone of ordinary skill in the art at the time of the invention to combine Parra with the Mindlin and Uchiyama device to have a portable verification system such that the user can swipe the card of Parra to compare their voice identification instead of verbally speaking every time identification is needed. Furthermore, this keeps the user's voiceprint uniform as the voice may change due to age or sickness and identification will be incorrect.

As per claim 6, claim 5 is incorporated and Uchiyama and Mindlin fail to teach, but Parra teaches:

a magnetic card and the set of topological indices for the speaker is stored in the magnetic card. (Parra, column 2, lines 46-53, ...*The digitized portions of the card owner's name (for example) voice samples, prepared as described herein, are recorded on the magnetic strip of a credit bank, or charge card. At the point of use, the card holder is requested to speak his or her name which is transduced to electrical signals, digitized and compared against a stored digital rendition using the principles of this invention*..., Parra stores the voiceprint of the speaker on a portable device.)

It would have been obvious to someone of ordinary skill in the art at the time of the invention to combine Parra with the Mindlin and Uchiyama device to have a portable verification system such that the user can swipe the card of Parra to compare their voice identification instead of verbally speaking every time identification is needed. Furthermore, this keeps the user's voiceprint uniform as the voice may change due to age or sickness and identification will be incorrect.

As per claim 7, claim 6 is incorporated and Uchiyama and Mindlin fail to teach, but Parra teaches:

the magnetic card comprises a magnetic strip that stores the set of topological indices for the speaker. (Parra, column 2, lines 46-53, *...The digitized portions of the card owner's name (for example) voice samples, prepared as described herein, are recorded on the magnetic strip of a credit bank, or charge card. At the point of use, the card holder is requested to speak his or her name which is transduced to electrical signals, digitized and compared against a stored digital rendition using the principles of this invention...*, Parra stores the voiceprint of the speaker on a portable device.)

It would have been obvious to someone of ordinary skill in the art at the time of the invention to combine Parra with the Mindlin and Uchiyama device to have a portable verification system such that the user can swipe the card of Parra to compare their voice identification instead of verbally speaking every time identification is needed. Furthermore, this keeps the user's voiceprint uniform as the voice may change due to age or sickness and identification will be incorrect.

As per claim 9, claim 4 is incorporated and Uchiyama and Mindlin fail to teach, but Parra teaches:

an electronic storage device as the portable device. (Parra, column 5, lines 32-39, *...the card of U.S. Pat. No. 4,827,518 would actually contain printed circuits which would interact with the user interface terminals...*)

It would have been obvious to someone of ordinary skill in the art at the time of the invention to combine Parra with the Mindlin and Uchiyama device to have a portable verification system such that the user can swipe the card of Parra to compare their voice identification instead of verbally speaking every time identification is needed. Furthermore, this keeps the user's voiceprint uniform as the voice may change due to age or sickness and identification will be incorrect.

As per claim 10, claim 4 is incorporated and Uchiyama and Mindlin fail to teach, but Parra teaches:

an optical storage device as the portable device. (Parra, column 7, lines 17-23, ...*A storage unit 25, which may be an optical CD*...)

It would have been obvious to someone of ordinary skill in the art at the time of the invention to combine Parra with the Mindlin and Uchiyama device to have a portable verification system such that the user can swipe the card of Parra to compare their voice identification instead of verbally speaking every time identification is needed. Furthermore, this keeps the user's voiceprint uniform as the voice may change due to age or sickness and identification will be incorrect.

As per claim 23, Uchiyama teaches:

a microphone to receive a voice sample from a speaker; (Uchiyama, column 4, lines 1-14, ...*microphone*...)

Uchiyama fails to fully teach, but Mindlin teaches:

a processing unit connected to the microphone, the processing unit operable to extract topological information from the voice sample from the speaker to produce topological rational numbers from the voice sample and to compare the rational numbers of the known speaker to the topological rational numbers from the voice sample to determine whether the speaker is the known speaker. (Uchiyama teaches the speaker verification which would include a processing unit connected to the microphone to compare a voice sample with a known reference. Mindlin teaches that topological rational numbers are verified to determine if the initial template identification was correct, Mindlin, Section 7, Template verification. Therefore, there is a comparison between a known reference and a hypothesis for verification. Table 1 shows that relative rotation rates are rational numbers and the rates are the outputs for comparison in Mindlin, Page 238, column 2.)

It would have been obvious to someone of ordinary skill in the art at the time of the invention to combine Mindlin with the Uchiyama device because all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention. NPL Document ("Nonlinear aspects of analysis and synthesis of speech time series data" hereinafter Trevisan) teaches that "Since realistic models of the folds can indeed present complex features at the level of the vocal fold oscillations, and even chaos [16, 6], it is important to know what to expect from the

simplest models. Finally, we claim that a fitting procedure of physical parameters (of eventually richer models) can constitute an additional approach to the problem of speaker verification." Therefore, Trevisan teaches that it would have been obvious to model speaker verification using chaos theory and thus, the combination of Mindlin with Uchiyama would have been obvious to someone of ordinary skill in the art at the time of the invention.

Uchiyama and Mindlin fail to teach, but Parra teaches:

a reader head to read voice identification data of rational numbers that represent a known speaker from a portable storage device; and (Parra, column 2, lines 46-53, *...At the point of use, the card holder is requested to speak his or her name which is transduced to electrical signals, digitized and compared against a stored digital rendition using the principles of this invention...* The name is transduced to be compared to the digitized signal present on the card (portable device), There would have been a reader device because the processing does not occur on the card (portable device).)

It would have been obvious to someone of ordinary skill in the art at the time of the invention to combine Parra with the Mindlin and Uchiyama device to have a portable verification system such that the user can swipe the card of Parra to compare their voice identification instead of verbally speaking every time identification is needed. Furthermore, this keeps the user's voiceprint uniform as the voice may change due to age or sickness and identification will be incorrect.

Claims 24-26 are rejected for the same reasons as claims 6, 10, and 9 respectively because Parra utilizes the data on the storage devices (claims 6, 10, and 9), therefore there are readers for interpreting the data from those devices as claimed in claims 24-26.

13. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Uchiyama et al. (US Patent #5121428 hereinafter Uchiyama) in view of NPL document ("Topological analysis and synthesis of chaotic time series" hereinafter Mindlin) with motivation from NPL Document ("Nonlinear aspects of analysis and synthesis of speech time series data" hereinafter Trevisan) and further in view of Parra. (US Patent #5313556) and further in view of Davis et al. (US Pre-Grant Publication #20020147588).

As per claim 8, Mindlin teaches that the topological indices are the extracted features.

As per claim 8, Uchiyama, Mindlin, and Parra fail to teach, but Davis teaches:

the portable device has a surface that is printed with a bar code pattern and the set of topological indices for the speaker is stored in the bar code pattern. (Davis, ¶ 0025, *...a binary or other coded data input device 22 that reads data from magnetic strips, bar codes, or other recording media commonly carried on data cards and other types of cards...*)

It would have been obvious to someone of ordinary skill in the art at the time of the invention to try the combination of Davis with the Uchiyama, Mindlin, and Parra device because Davis provides methods and systems for interacting with a biometric verification system and further provides a different way of human interaction with the biometric device such that Davis could provide a multi-modal method further assisting the initial voiceprint method.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Refer to PTO-892, Notice of References Cited for a listing of analogous art.

15. Applicant's submission of an information disclosure statement under 37 CFR 1.97(c) with the fee set forth in 37 CFR 1.17(p) on 9/11/2008 prompted the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 609.04(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to GREG A. BORSETTI whose telephone number is (571)270-3885. The examiner can normally be reached on Monday - Thursday (8am - 5pm Eastern Time).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, RICHEMOND DORVIL can be reached on 571-272-7602. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Greg A. Borsetti/
Examiner, Art Unit 2626

/Talivaldis Ivars Smits/
Primary Examiner, Art Unit 2626

10/27/2008